Active Project (2016 - 2016)

A wide-temperature range wire-line communication link using the NASA Glenn SiC JFET technology, Phase I Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)

ABSTRACT

NASA has demonstrated a resolve for a flagship mission in the coming years to revisit Venus and land instruments on the surface. Venus has a corrosive, high pressure (~100 bar), high-temperature (up to 500 C) environment presenting extreme design challenges for lander electronics. The ability to establish simple wire-line communications between circuits operating in extremely disparate temperature domains is a critical need. Different technologies have specific strengths (complexity, density, area, power) which span from high-performance, lower-temperature silicon to medium-density SiC-CMOS and lower-density, high-reliability SiC JFET-R. A viable lander design requires applying the right technology to each temperature domain. The premier IC process for ultra-high temperatures is the SiC JFET technology developed at NASA Glenn Research Center (GRC). In Phase I, Ozark IC proposes to use its extensive high temperature device and circuit expertise to create a PDK for the GRC SiC JFET process. Pre-existing designs by NASA will be recaptured with the PDK and simulation results will be validated against measured data. An RS-485 transceiver circuit will be designed using the PDK and verified such that it is ready for fabrication at the conclusion of Phase I.

ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: NASA has demonstrated a resolve for a flagship mission in the coming years to revisit Venus and land instruments on the surface. Venus has a corrosive, high-pressure (~100 bar), high-temperature (up to 500C) environment. The SiC-JFET technology and RS-485 link proposed complement Ozark IC's existing SiC-CMOS designs, including a general-purpose microprocessor and an integrated UV camera, that can be combined to create scientific instruments and housekeeping

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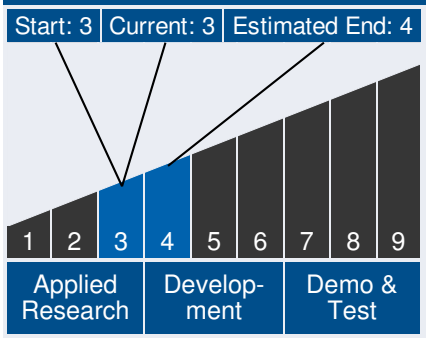
Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

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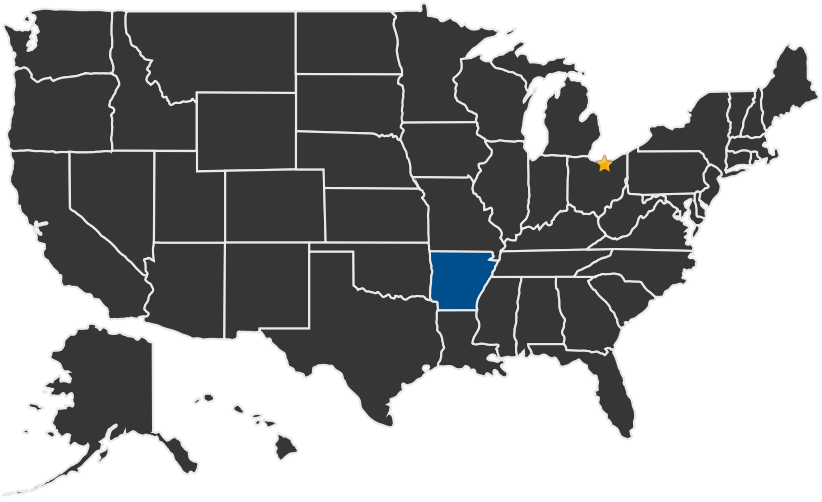
circuits that can operate at Venus surface temperature conditions.

To the commercial space industry:

Potential Non-NASA Commercial Applications: The RS-485 data link standard is already a ubiquitous element in many applications: Oil Exploration - Deep well monitoring units can use the RS-485 to network sensors and actuators; Mil-Aero - Health monitoring of jet engines and turbines; Automotive - Health monitoring of internal combustion engines, exhaust systems, and emission controls; Industrial - Combustion and emission controls; Science - (Terrestrial) High temperature manufacturing processes

U.S. WORK LOCATIONS AND KEY PARTNERS



U.S. States With Work

Lead Center:
Glenn Research Center

Other Organizations Performing Work:

- Ozark Integrated Circuits, Inc. (Fayetteville, AR)

Management Team *(cont.)*

Program Manager:

- Carlos Torrez

Principal Investigator:

- James Holmes

Technology Areas

Primary Technology Area:
Science Instruments, Observatories, and Sensor Systems (TA 8)
└ In-Situ Instruments and Sensors (TA 8.3)
  └ In-Situ (other) (TA 8.3.3)

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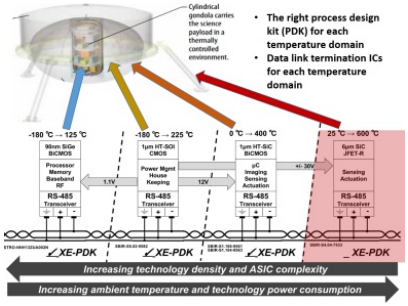
PROJECT LIBRARY

Presentations

- Briefing Chart
  - (http://techport.nasa.gov:80/file/23465)

IMAGE GALLERY



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DETAILS FOR TECHNOLOGY 1

Technology Title

A wide-temperature range wire-line communication link using the NASA Glenn SiC JFET technology, Phase I

Potential Applications

NASA has demonstrated a resolve for a flagship mission in the coming years to revisit Venus and land instruments on the surface. Venus has a corrosive, high-pressure (~100 bar), high-temperature (up to 500C) environment. The SiC-JFET technology and RS-485 link proposed complement Ozark IC's existing SiC-CMOS designs, including a general-purpose microprocessor and an integrated UV camera, that can be combined to create scientific instruments and housekeeping circuits that can operate at Venus surface temperature conditions.